Appendix B - Additional NAS Systems

System	Current Status & Future Plans
ARSR-4 Air Route Surveillance Radar - Model 4 is a long-range, three-dimensional, rotating phased array, primary radar system with coverage of 250 nmi. The system provides several improvements over other long-range radar systems, including improved target detection and better weather data. It is part of the Joint Surveillance System (JSS) used in conjunction with ARSR-3 coverage as part of the nationwide air defense command surveillance network. In addition to functions particular to the military, the ARSR-4 performs the same basic functions of the ARSR-3, by providing primary long-range surveillance data, including slant range and azimuth data for En Route operation.	There are 43 operational systems deployed around the periphery of the continental U.S., as well as in Guam, Hawaii, and Guantanamo Bay, Cuba. The ARSR weather data available on the En Route controller displays is being replaced by high-quality NEXRAD graphical weather data from WARP. Because most tracking is performed with beacon rather than primary radar data, and because ARSRs are expensive to maintain, they were to have been decommissioned when WARP became operational. However, recent events have reinforced the need to continue operation.
ASR-9 Airport Surveillance Radar - Model 9 is a short-range (60 nmi) primary surveillance radar system for the airport terminal area. The ASR-9 has a separate weather channel with associated processing capable of providing six-level weather contours. It is normally used in conjunction with Mode Select (Mode S) but it can accommodate an ATCBI-4/5. ASR-9s also feed the En Route automation systems to fill gaps in coverage from long-range radars.	All ASR-9 systems are delivered and commissioned. Due to an increased number of power outages, equipment outages, Occupational Safety and Health Administration concerns, and diminishing manufacturing sources (obsolete parts), a Service Life Extension Program (SLEP) has been initiated. In December 2001, the FAA signed a contract for a Phase 1 SLEP study.
ASWON Aviation Surface Weather Observation Network will supply automated surface weather observations to meet the needs of pilots, operators, and air traffic personnel. ASWON includes five systems: Automated Surface Observing System (ASOS), ASOS Controller Equipment Information Display System (ACE-IDS), Automated Weather Observing System (AWOS), Stand-Alone Weather Sensors (SAWS), and Automated Weather Sensors Systems (AWSS). ASOS, AWOS, and AWSS provide current surface weather observations to pilots and air traffic controllers. ACE-IDS displays operational and administrative data to air traffic controllers. SAWS is intended to be a back-up system to ASOS at up to 270 Level C airports.	There are 569 FAA-sponsored ASOS sites commissioned and 180 FAA AWOS units. Seven ACE-IDS have been installed. About 20 SAWS are installed to date. One AWSS unit has been installed. Plans include product improvements and upgrades for the ASOS. Also, additional ACE-IDS and AWSS units will be deployed and 250 additional SAWS units will be installed.
CDTI Cockpit Display of Traffic Information will provide the platform for displaying position (latitude, longitude, and altitude) and heading data for nearby aircraft to the pilot(s). Terrain information, moving maps, and other situational awareness information can also share this display. CDTI is used in conjunction with ADS-B for air-to-air "see-and-avoid" applications and can receive traffic data from multiple sources (ADS-B, TIS-B, Traffic Alert and Collision Avoidance System [TCAS], etc.). The CDTI can also be integrated with other functions such as weather, navigation, and terrain information for a multifunction display.	There are multiple vendors who are offering CDTI systems. Some are being evaluated in the SF-21 program. Supplemental-Type Certificate (STC) approval for installation of ADS-B/CDTI on two aircraft types has been received. A concept of operation for CDTI Enhanced Flight Rules is being developed. The SF-21 program office is supporting the effort to obtain STC approval for Surface Moving Map functionality on those aircraft with CDTI displays and will continue the activities associated with development and use of procedures for CDTI and "Electronic Flight Rules" in the terminal environment.

System	Current Status & Future Plans
Common ARTS ARTS programs have a common air traffic control mission with similar functional requirements. Common ARTS provides identical COTS microprocessors and software developed in a high order language. Common ARTS has been implemented at 131 small-to-medium-sized TRACONs as ARTS IIE systems and at 6 large TRACONs as ARTS IIIE systems.	Common ARTS operational deployment began in 1997. It will remain the primary Terminal automation system until it is replaced with STARS.
DSR Display System Replacement provides continuous real-time, automated support to air traffic controllers for the display of surveillance, flight data, and other critical control information. DSR consists of three types of consoles, Radar, Data, and Auxiliary, which are fed by two En Route automation systems, Host Computer System (HCS) as a primary source and Direct Access Radar Channel as a back-up source.	All DSR installations were completed in 2000. In 2002, WARP began providing improved weather radar mosaics of precipitation intensity data from NEXRAD to En Route controllers on DSR, integrated with surveillance targets. This enhances the ability of En Route controllers to provide weather safety advisories to aircrews and for traffic managers to conduct planning for alternate route selection around hazardous weather. The D-console is being upgraded by the URET program. The new console, a 20-inch flat panel mounted on an adjustable arm, will be fed by HCS (for legacy functions) and by the Conflict Probe (CP) processor. The console will be logically switchable between HCS and CP at the controller's option.
DUAT Direct User Access Terminal is a service that provides pilots convenient access to pre-flight aeronautical and weather information for flight planning. It allows pilots to input Instrument Flight Rules (IFR), ICAO, and Visual Flight Rules flight plans into the system.	DUAT processes over 600,000 transactions each month. The OASIS program will incorporate the DUAT services.
FANS 1/A Future Air Navigation System 1/A uses the Oceanic Data Link to provide ADS-A service in the Oceanic domain.	FANS 1/A is currently used in the Oceanic domain and over land areas in several non-U.S. regions of the world. FANS 1/A will continue to be used in the Oceanic domain for the foreseeable future.
FSA The Flight Schedule Analyzer consists of two parts: post-analysis FSA and real-time FSA. Post-analysis FSA graphically shows data and analysis results on how well a Ground Delay Program (GDP) performed and what factors impacted performance. Real-time FSA generates a collection of dynamic Web-based reports that allows the ATCSCC to monitor GDPs as they are executing.	Post-analysis FSA was deployed at the ATCSCC in April 2000. Real-time FSA was deployed in April 2001. Future planned enhancements include the delivery of an airline-tailored "Day after GDP performance report" to each airline.
HCS The Host Computer System processes surveillance reports and flight plan information in the ARTCC. The Host/Oceanic Computer System Replacement (HOCSR) Phase 1 replaced the main processors of the HCS, Oceanic Display and Planning System, and Offshore Flight Data Processing System. Phase 2 up-leveled NAS software to operate in the Native System/390 mode and provides a common monitor for En Route and Oceanic. Phase 3 replaces the Direct Access Storage Devices (DASDs) and provides minimal monitor and control capability for the DASDs. Phase 4 replaces the remaining peripherals.	HOCSR Phases 1 and 2 are complete. Phase 3 is scheduled to be completed in 2003. ERAM will replace the HCS.

System	Current Status & Future Plans
MicroEARTS The Micro En Route Automated Radar Tracking System is a radar processing system for use in both En Route and Terminal environments. Additionally, MicroEARTS supports a combination of Oceanic and En Route functions in Anchorage, AK. The system provides single sensor and mosaic display of traffic and weather, using long- and short-range radars. In Anchorage, MicroEARTS also supports ADS-B input processing and display. MicroEARTS supports multiple types of displays, including DSR, DBRITE, and the flat panel tower controller displays.	FAA MicroEARTS are operational in Anchorage, Honolulu, Guam, and San Juan. Additionally, there are four MicroEARTS operated by the DoD. ATOP will replace the Anchorage MicroEARTS. STARS will replace the others. The FAA is investigating incorporating NEXRAD data onto MicroEARTS displays at various sites.
Mode S The Mode Select beacon system is a combined secondary surveillance radar (beacon) and ground-air-ground data link system designed to replace the aging Air Traffic Control Radar Beacon Systems (ATCRBS). Mode S is capable of common-channel interoperation with the current ATCRBS, thus has been phased in over an extended transition period. Mode S can operate in a stand-alone manner or in conjunction with Terminal or digitized En Route radars and provide radar-reinforced beacon reports.	There are 144 operational Mode S sites. Presently 108 of the nations' busiest airports have Mode S ground stations. The majority of aircraft landing at these airports have Mode S transponders. Mode S is used in TCAS and many other applications. Future plans include a SLEP.
PRM The Precision Runway Monitor provides the capability to conduct simultaneous IFR approaches to parallel runways spaced less than 4,300 feet apart, thus returning lost capacity, reducing delays, and improving fuel savings. Scanning four to five times faster than existing surveillance radars, PRM tracks and displays each aircraft and updates position and velocity every second. Air traffic controllers monitor the progress of each aircraft in real-time and issue directions as required to maintain safe aircraft separation.	PRM systems have been commissioned at the Minneapolis-St. Paul International Airport, Philadelphia, and Lambert-St. Louis International Airport. Additional systems are designated for New York's JFK Airport, San Francisco, and Atlanta, with commissioning scheduled to be completed by 2004.
RMMS The Remote Maintenance Monitoring System checks system performance to detect alarm or alert conditions and transmits appropriate messages to the Maintenance Processor Subsystem. RMMS initiates diagnostics tests and adjusts/changes system parameters or configurations when properly commanded.	There are approximately 5,000 RMMS units in service today. However, because the RMMS hardware and software components are at, or approaching, obsolescence they will be integrated into NIMS.
TAWS Terrain Awareness and Warning System uses advanced electronic technology equipment to provide a "look-ahead" capability that gives flight crews automatic aural and visual warnings of possible terrain hazards.	TAWS has been installed in more than 6,000 aircraft. TAWS is scheduled to be installed on 27 FAA aircraft during the next five years.
TCAS The Traffic Alert and Collision Avoidance System provides pilots information on the position of nearby aircraft as an aid to "see-and-avoid." The system also issues Traffic Alerts on aircraft that may be a collision threat. TCAS I is mandated on aircraft with 10 to 30 seats, although the more expensive TCAS II may be installed instead. TCAS II is a more sophisticated system which provides the information of TCAS I, and also analyzes the projected flight path of approaching aircraft and issues Resolution Advisories to pilots to resolve potential mid-air collisions. TCAS II is required in aircraft with more than 30 seats.	TCAS is mandatory for all aircraft carrying 30 passengers or more. On November 1, 2001, the FAA issued a Notice of Proposed Rulemaking, which states that TCAS, or an FAA-approved alternative, must be installed on cargo aircraft by October 31, 2003.

System	Current Status & Future Plans
TDWR Terminal Doppler Weather Radar is utilized for the detection of hazardous weather conditions such as wind shear, microbursts and gust fronts, winds, precipitation, thunderstorms, and turbulence at an airport. This weather information is provided to air traffic personnel on displays at Terminal facilities and to pilots via Terminal Weather Information for Pilots (TWIP).	All 47 TDWR systems have been installed. In 2002, the FAA began replacing the TDWR radar product generator to improve system performance. Upgrades include new hardware and re-hosting software for the Digital Signal Processor and radar data acquisition and replacing antenna motors and hardened elevation drive bearings. Upgrades will continue with the addition of a 360^{o} detection scan plus other improvements to increase the detection capability of wind shear/microbursts and gust fronts.
UAT The Universal Access Transceiver is a radio data link system supporting broadcast services including ADS-B, TIS-B, and FIS-B. The UAT data link is a remote mounted radio that provides communication capability between aircraft and the ground.	UAT is currently being used in the SF-21 program. Plans include completing RTCA UAT Minimum Operational Performance Standards and UAT ICAO Standards and Recommended Practices. UAT will continue to be used in the SF-21 program.
VDL-3 VHF Digital Link Mode-3 was selected as the technology for the future air/ground communication system. The VDL-3 system will provide multiple channels to operate on one 25-kHz frequency assignment. The system will utilize Differential 8 Phase Shift Keying and employ 4.8 kilobits per second vocoders for voice operation. While current planning calls for operating the system in a 2-voice/2-data configuration, other combinations are also supported. In the fully operational state, the system will accommodate both voice and data and will have the flexibility to determine how the channel resources are applied for voice and data.	Under agreements with three vendors, the FAA will partially fund development of VDL-3 avionics. Standards for the VDL-3 system have been validated with implementation and operational validation soon to be initiated. The NEXCOM radio will use VDL-3 technology.
WSD The Web Situation Display is a browser-based version of the Traffic Situation Display used by the ETMS.	There are approximately 350 current users of WSD and the number continues to grow.